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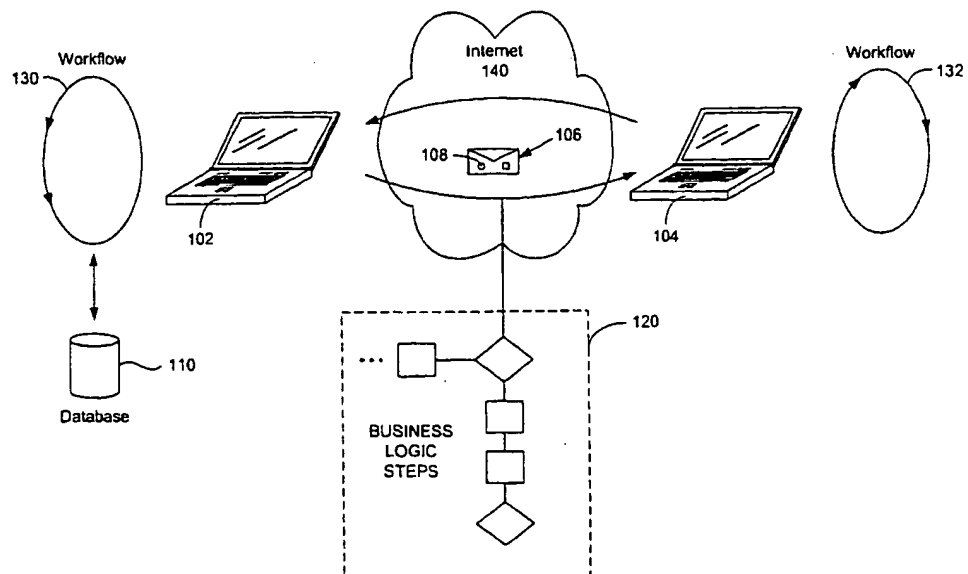
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[Continued on next page]

(54) Title: **LOGIC-ENHANCED EMAILS AND METHODS THEREFOR**



(57) Abstract: An improved technique for intelligently incorporating emails (106) into business processes of an organization. Email sender (102) may choose an object (108) from a library of objects (110) which have therein data and instructions for carrying out predefined business logic steps in furtherance of the business process. The object (108) may then be associated with the email (106) and trigger the business logic steps (120) upon being sent, thereby freeing the recipient (102) from having to manually initiate those business logic steps (120). The business logic steps (120) may involve multiple parties, other than the sender (102) and the recipient (104), and may be executed over time as conditions for their execution are satisfied.

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## LOGIC-ENHANCED EMAILS AND METHODS THEREFOR

### BACKGROUND OF THE INVENTION

The present invention relates to systems and methods for enhancing the  
5 usefulness of emails transferred via a computer network, such as via an internal  
computer network of an organization or via a distributed computer network such as  
the Internet. More particularly, the present invention relates to techniques for  
enabling emails to be more intelligently integrated into the business processes of  
organizations, including enabling emails to trigger or be triggered by business logic  
10 steps in an intelligent manner.

Emails and email systems for providing computer users with email  
communication via a computer network, such as a corporate LAN or the Internet, have  
been around for some time. Email usage is pervasive, partly because of the speed, low  
cost, and convenience with which emails can be sent and received. Emails are also  
15 relatively non-intrusive, making it an ideal communication medium for point-to-point  
or point-to-multipoint communication of textual, visual and/or audio information  
between users.

By way of background, a simplified prior art email system is described  
hereinbelow. To send an email, a computer user nowadays may employ an  
20 appropriate desktop/mobile-based email application program (e.g., Outlook™ by  
Microsoft Corp.) or an Internet-based email application program (e.g., Yahoo™ mail  
or another email front end that is accessible via a web browser) to compose an email.  
To direct the email to reach the intended recipient, the sender may provide a unique  
recipient email address, which typically includes the recipient's user name and a  
25 domain name (which may be implied if the computer network is an internal network).  
Together, the recipient's user name and the domain name comprise a unique email  
address, which is typically included with the email envelope to be sent.

Once the sender or a program (generically referred herein simply as the sender to simplify discussion) issues the command to send the composed email message to the specified unique email address, the email content, with the unique recipient email address as part of its envelope, is sent via the computer network, e.g., the Internet or the corporate LAN, to an email server that services the specified domain. In the case of the Internet, the email typically passes through a plurality of mail relay stations along the way. Once the email arrives at the email server that services the specified domain, the email system may notify the recipient that he has an email waiting to be retrieved, or the email system simply waits until the recipient logs in to check his email folder to inform him of the existence of a new email to be read.

It has been found, however, that emails are not particularly efficient when they are employed as part of a business process in a modern organization. To elaborate, emails nowadays are essentially a form of asynchronous communication between the sender and the recipient with little intelligence or ability to trigger selective business logic steps based on the content of the email message and/or other external factors. By way of example, if the email is sent as a part of a business process (such as an email from a given employee requesting the purchase of some particular stationary item), the business logic steps to be taken to satisfy the business process nowadays depend mostly on the conscious action(s) of the recipient. With reference to the previous example, the recipient of the stationary purchase request email may, upon reviewing the content of the request, execute the business process by forwarding the email to the appropriate office supply ordering person to place the order, to the accounting department for approval, back to the sender to confirm that the purchase request has been attended to, and the like. Another business process email requesting, for example, vacation time off may require the recipient to open the email, read the content, and execute different business logic steps to execute the business process at issue. In this vacation time request email example, the recipient may forward the email to the human resource department, to the immediate manager of the requesting employee to gain approval, to the employee to acknowledge receipt of the vacation time request, and the like.

In either of the above examples, since the business process to be taken depends on the content of the email message, the current email art makes it necessary for the

recipient to read the content, to decide on the business logic steps to be taken and with whom further communication needs to be made in order to properly execute the business process at issue. For a small organization (e.g., below 10 employees with relatively few complex business processes), this paradigm may suffice. In a typical  
5 organization involving thousands of employees and hundreds of different business processes, this paradigm proves to be an inefficient way of carrying out the business processes.

At minimum, the current paradigm puts an unreasonable burden on the recipient to remember the business logic steps to be taken (and all the parties to be  
10 communicated) for every business process-related email that may come his way, and to execute them diligently and correctly every time. Even if these business logic steps can be organized and put into procedures for employees to follow, organizations frequently streamline (i.e., modify) their business process steps and people in organizations frequently change their jobs, making it extremely difficult to keep up in  
15 a timely manner. If an employee of an organization fails to diligently note such changes and to incorporate them into his future responses to the business process emails that he receives, there is a risk that the business process will not be correctly handled and/or the communication be misdirected. In any of the above cases, productivity suffers.

20 In view of the foregoing, there are desired improved techniques which extend email communication beyond the current store-and-relay paradigm, and for enabling emails to be more intelligently integrated into the business processes of an organization, including enabling emails to trigger or be triggered by selective business logic steps which change depending on the content of the email sent and other  
25 external factors.

SUMMARY OF THE INVENTION

The invention relates, in one embodiment, to an improved technique for more intelligently incorporating emails into business processes of an organization. In  
5 accordance with one aspect of the present invention, there is provided a library of objects which have therein data and instructions for carrying out predefined business logic steps in furtherance of the business process. The object, when chosen to be part of the logic-enhanced email to be sent, automatically triggers business logic steps, thereby freeing the recipient from having to manually initiate those business logic  
10 steps.

These business logic steps may include, for example, updating other databases, forwarding all or part of the logic-enhanced email to the appropriate recipients based on the object type and/or other external factors encountered, filling out any required forms, performing any required notification and/or confirmation, and the like. Each  
15 business logic step may be carried out over time and/or triggered by the completion of other business logic steps and/or. Since the objects are centralized in a database from which users make their selections, maintenance and updates of business processes are substantially simplified. Further, since the business logic steps are automatically  
20 triggered, the burden on the employees of the organization to keep up with changing procedures and job titles are substantially relieved, thereby improving reliability and accuracy in the performance of the business processes.

These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like  
5 reference numerals refer to similar elements and in which:

Fig. 1 illustrates in a symbolic format a proposed technique for more intelligently incorporating emails into business processes of an organization.

Fig. 2 shows in a symbolic format an exemplary email message, which includes an envelop, an object, and a status window.

10 Fig. 3 shows, in accordance with one embodiment of the present invention, exemplary steps involved in sending out a typical logic-enhanced email.

Fig. 4 shows, in accordance with one embodiment of the present invention, exemplary steps involved in receiving a logic-enhanced email  
15 message.

FIGS. 5A and 5B illustrate an exemplary computer suitable for implementing embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described in detail with reference to a few preferred embodiments thereof as illustrated in the accompanying drawings.

5 In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process steps and/or structures have not been described in detail in order to not  
10 unnecessarily obscure the present invention.

The invention relates, in one embodiment, to an improved technique for more intelligently incorporating emails into business processes of an organization. In accordance with one aspect of the present invention, there is provided a library of objects which have therein data and instructions for carrying out predefined business  
15 logic steps in furtherance of the business process. The object, when chosen to be part of the logic-enhanced email to be sent, automatically triggers business logic steps, thereby freeing the recipient from having to manually initiate those business logic steps. These business logic steps may include, for example, updating other databases,  
20 forwarding all or part of the logic-enhanced email to the appropriate recipients based on the object type and/or other external factors encountered, filling out any required forms, performing any required notification and/or confirmation, and the like. Each business logic step may be carried out over time and/or triggered by the completion of other business logic steps and/or. Since the objects are centralized in a database from which users make their selections, maintenance and updates of business processes are  
25 substantially simplified. Further, since the business logic steps are automatically triggered, the burden on the employees of the organization to keep up with changing procedures and job titles are substantially relieved, thereby improving reliability and accuracy in the performance of the business processes.

To facilitate discussion, Fig. 1 illustrates in a symbolic format a proposed  
30 technique for more intelligently incorporating emails into business processes of an



organization. In Fig. 1, there are shown a sender 102 and a recipient 104, representing the two exemplary parties involved in email communication. As before, communication is facilitated when sender 102 sends a logic-enhanced email message 106 to recipient 104. Unlike the prior art email message, however, the logic-enhanced email message 106 of the present invention includes an object 108, which is selected for the particular business process requested by the sender. This object 108 is selected from a pool of objects stored in a database 110, which is preferably managed, maintained, and made available to any authorized user of the logic-enhanced email system. By allowing the sender to select the appropriate business object to suit his purpose, and by including data/instructions within the objects to allow business logic steps to automatically take place, the invention eliminates one significant source of error in the prior art, i.e., the need for the recipient to read and interpret the request and to associate the request with the appropriate company procedure (business process) to handle the request.

Each business object preferably includes instructions to one or more computer systems in the network to carry out the business logic steps involved in the business process. By way of example, a logic-enhanced email requesting the purchase of additional laptop computers may be formed by selecting an appropriate procurement object. That object would have therein computer instructions for seeking the approval from an immediate supervisor, possibly by automatically sending an email form to the supervisor for approval. Upon approval, the instructions within the object may cause the order to be transmitted to the buyer for the organization, to the MIS department, and to the accounting department.

Thus, upon sending the email, the computer associated with the sender, or a designated computer disposed in the path between the sender and the recipient, or the recipient computer may begin executing the instructions. In general, it is preferable that the instructions be carried out by a computer specifically designated to intercept and service the objects associated with the email sent. In one example, the email server may promiscuously monitor emails for the presence of objects therein and cause the execution of the instructions if an object is detected. Note that since the instructions may involve different parties and over different time periods, it is contemplated that different instructions may be carried out by different computer at

different times, unless it is designated in advance that a single computer has been designated to carry out all the instructions. If desired, the status of completion/action of each business logic steps associated with a given object may be kept at a central place for ease of management purpose.

5           By way of a different example, a logic-enhanced email from an employee requesting a week vacation over the Christmas holiday season may have therein computer instructions for consulting with the vacation request database to make sure that the current request, if approved, does not leave the company vulnerable to staff shortage during the Christmas holiday. If no such conflict exists, the request, along  
10       with the data from the vacation request database may be routed to the immediate supervisor, the human resource administrator, and perhaps other people depending on the status of the sender (e.g., more people would be notified if the sender is a key employee; fewer if the sender is one among hundreds of employees whose job is readily interchangeable). If there is a conflict, the request and the accompanying data  
15       may be sent anyway to a higher level manager to resolve the conflict or to make the appropriate recommendation.

          In general, the instructions underlying the business logic steps of an object may be executed in whole or in part immediately upon being sent. Some of these  
~~steps may have their execution conditioned upon the recipient opening the email and~~  
20       reviewing the content. These step may take place automatically or may occur only after approval by the recipient (in which case, the actions suggested by the computer instructions within the objected may be presented to the recipient for approval prior being executed). These various business logic steps are shown in Fig. 1 within dotted line 120 as shown.

25           In general, objects may be classified in accordance to their type (e.g., procurement, vacation request, time reporting, etc.), each of which may have further sub-classifications. Instructions (and optionally data) are included in the objects to influence the manner in which the business process is carried out. The instructions may include not only executable statements but also looping and conditional  
30       statements, as well as other programming statements typical of programming languages since the instructions may be, but not required to be, coded by any one of

the programming languages themselves. Some or all of these instructions may execute immediately, or may be activated upon sending and await some triggering event prior to execution.

Various other attributes may be associated with an object. By way of example, an object may have a priority scheme associated with one or more of its business logic steps. Roles represent one type of attribute that may be employed to qualify the behavior of a particular object. By way of example, the role of the recipient or the target of a particular business logic step may determine how a particular email message is handled (e.g., priority, confidentially, etc.). The responsibility of the recipient or the target of a particular business logic step may also influence how a particular email message is handled. By way of example, if the recipient does not have the authority to respond to the request (e.g., this particular request involves an amount that exceeds the approval authority of one who ordinarily receives requests involving lesser amounts), the instructions within the attached object may cause other business logic steps to be carried out instead.

Triggers, which may be external or may depend on the occurrence/completion of other business logic steps associated with the object, may gate one or more business logic steps. These triggers may include, for example, time (e.g., an upcoming due date may trigger a particular business logic step or a particular series of steps), event, or data (e.g., a business logic step may occur only if the value of some specified data item is within a certain range), and others. Forms and attachments may also be part of an object to allow further operation and/or viewing by the sender and/or recipient at a later date or as part of some future business logic steps to be taken.

Additionally or alternatively, the sender may also specify one or more due dates or reminder dates in connection with one or more of the business logic steps. These dates may be employed to trigger certain actions or cause a specified notification communication to be sent. Additionally or alternatively, one or more of the business logic steps may have associated therewith a status field to enable the sender (and/or recipient) to ascertain the status of each action item to be taken in furthering the business process. One of ordinary skills in the art will readily recognize that the above list of attributes is merely illustrative and not limiting of the attributes

that a business object may have. In fact, it is contemplated that each object may be thought of as a set of computer instructions, and the permutation associated therewith is limited only by the imagination.

Fig. 1 further illustrates two workflows 130 and 132 associated with sender 102 and recipient 104 respectively. These workflows are included to illustrate that the logic-enhanced emails may be triggered by an existing workflow and/or the sending of the logic-enhanced emails may trigger workflows at the sender. Likewise, the receipt of a logic-enhanced email by the recipient may trigger another workflow and/or influence its execution. These are possible because the logic-enhanced emails now have associated with them data (e.g., in the form of attributes and/or other user-entered data) and instructions in addition to the textual/visual/audio content traditionally sent via email. For completeness, the Internet 140 is also shown. Although the present invention is particularly well adapted for use in the Internet environment and on any Internet-accessible device (e.g., Internet-enabled phones, palm-tops, as well as desktop/mobile browsers), it should be noted that the invention may also be employed on purely internal computer networks. Thus, sender 102 and recipient 104 may represent users connected via a corporate LAN, or users connected through the Internet or Intranet without detracting from the scope of the present invention.

Fig. 2 shows in a symbolic format an exemplary email message 202, which includes an envelope 204, an object 206, and a status window 208. Envelope 204 is conventional and represents the electronic envelope that enables the user to specify the recipient identity information and any additional messages to be read by the recipient. Even though the objects have attributes, the sender may also set parameters associated with envelope 204 to more precisely specify how the email message should be routed. These parameters may be associated with the entire email message and may not be specific to any particular business logic steps (which is one advantage of the attributes specified within the object). By way of example, the sender may predefine in advance the access control to the object, i.e., who can have access to selected components of the logic-enhanced email at any given point in time. Access control may also include definition of where the objects are to be kept after the logic-enhanced email is sent until the objects are needed (which maybe within database 110 or under control of the

recipient). Again, the list of possible parameters may be infinite but they may contain data such as whether the sender wishes to receive confirmation that the recipient has received (and/or opened) the email message, whether any due date-driven reminder should be activated, whether the email message should be expedited, and the like.

5           Status window 208 represents the software-implemented window that permits the sender to inquire on the status of completion of the business logic steps. By way of example, a sender may be able to access a datastore (such as an outbox in an email system) where all his logic-enhanced email messages are kept and may drill down on any one of the logic-enhanced email messages to inquire about the status of execution  
10 of the various business logic steps. Note that unlike the prior art wherein email status is typically limited to whether an email has been sent/opened/deleted, the sender of the logic-enhanced email of the present invention can check to determine how much of the business process has been completed by checking on the progress of the various business logic steps associated therewith. In this manner, the work involved in  
15 checking on the status, in responding to status check on the part of other employees, and the like, is substantially reduced.

          Fig. 3 shows, in accordance with one embodiment of the present invention, exemplary steps involved in sending out a typical logic-enhanced email. In step 302, the sender may start the process of sending the logic-enhanced email by, for example,  
20 invoking the email front-end. In step 304, the sender may select an appropriate object from database 110 to be included with the logic-enhanced email to be sent. In this step 304, any data requested by the object (e.g., any form to be filled out) and/or attributes may also be input by the user. These data and attributes, as discussed earlier, vary widely and may also include such attributes as due dates, reminders,  
25 notifications, attachments, triggers, roles, responsibilities, and the like. In steps 306a-306d, the envelope is filled out with the identity of the recipient, any additional attachments or messages, any other parameters associated with the envelope, and the logic-enhanced email is then sent in step 308.

          Fig. 4 shows, in accordance with one embodiment of the present invention, exemplary steps involved in receiving a logic-enhanced email message. In step 402,  
30 the logic-enhanced email message is received by the recipient at the recipient mailbox.

The recipient, upon being notified, retrieves and opens the message in step 404. It should be noted that prior to the recipient's opening of the logic-enhanced message, some or all of the business logic steps associated with the object may have already executed. The execution sequence depends, of course, on the instructions themselves as well as the conditions/triggers on which they depend. On the other hand, some or all of the business logic steps may execute after being opened by the recipient (shown in step 408). The recipient of course may also take action in response to the message and/or the sequence of business logic steps (as shown in step 406). The action in step 406 and/or the business logic steps in step 408 may include forwarding the logic-enhanced email message or part of its content to other parties to complete the business process. Fig. 4 ends in step 410 as shown.

In general, the invention may be implemented in any network, over any kind of protocol and/or architecture. Thus, in one embodiment, the network on which the invention is implemented in a local area network, which may couple computers together using a medium such as copper wire, fiber optics, or even the air (wireless) interface. On another embodiment, the network on which the invention is implemented is a heterogeneous, distributed network such as the Internet in which the platforms are heterogeneous and widely distributed over large geographical distances. Further, it should be kept in mind that the invention may be implemented on any suitable networked computer and/or network-accessible devices. Desktop computers, laptop computers, network-enabled handheld computers (such as the Palm™-based or WindowsCE™-based computers), network-enabled telephones or cellular devices, etc.

FIGS. 5A and 5B illustrate a computer system 900, representing an exemplary computer suitable for implementing embodiments of the present invention. FIG. 5A shows one possible physical form of the computer system. Of course, as mentioned earlier, the computer system may have many physical forms ranging from an integrated circuit, a printed circuit board and a small handheld device up to a huge super computer. Computer system 900 includes a monitor 902, a display 904, a housing 906, a disk drive 908, a keyboard 910 and a mouse 912. Disk 914 is a computer-readable medium used to transfer data to and from computer system 900.

FIG. 5B is an example of a block diagram for computer system 900. Attached to system bus 920 are a wide variety of subsystems. Processor(s) 922 (also referred to as central processing units, or CPUs) are coupled to storage devices including memory 924. Memory 924 includes random access memory (RAM) and read-only memory (ROM). As is well known in the art, ROM acts to transfer data and instructions uni-directionally to the CPU and RAM is used typically to transfer data and instructions in a bi-directional manner. Both of these types of memories may include any suitable of the computer-readable media described below. A fixed disk 926 is also coupled bi-directionally to CPU 922; it provides additional data storage capacity and may also include any of the computer-readable media described below. Fixed disk 926 may be used to store programs, data and the like and is typically a secondary storage medium (such as a hard disk) that is slower than primary storage. It will be appreciated that the information retained within fixed disk 926, may, in appropriate cases, be incorporated in standard fashion as virtual memory in memory 924. Removable disk 914 may take the form of any of the computer-readable media described below.

CPU 922 is also coupled to a variety of input/output devices such as display 904, keyboard 910, mouse 912 and speakers 930. In general, an input/output device may be any of: video displays, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, biometrics readers, or other computers. CPU 922 optionally may be coupled to another computer or telecommunications network using network interface 940. With such a network interface, it is contemplated that the CPU might receive information from the network, or might output information to the network in the course of performing the above-described method steps. Furthermore, method embodiments of the present invention may execute solely upon CPU 922 or may execute over a network such as the Internet in conjunction with a remote CPU that shares a portion of the processing.

In addition, embodiments of the present invention further relate to computer storage products with a computer-readable medium that have computer code thereon for performing various computer-implemented operations. The media and computer code may be those specially designed and constructed for the purposes of the present invention, or they may be of the kind well known and available to those having skill in

the computer software arts. Examples of computer-readable media include, but are not limited to: magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROMs; and holographic devices; magneto-optical media such as floptical disks; and hardware devices that are specially configured to store and  
5 execute program code, such as application-specific integrated circuits (ASICs), programmable logic devices (PLDs) and ROM and RAM devices. Examples of computer code include machine code, such as produced by a compiler, and files containing higher level code that are executed by a computer using an interpreter.

While this invention has been described in terms of several preferred  
10 embodiments, there are alterations, permutations, and equivalents which fall within the scope of this invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.



*What is claimed is:*

1. A method for permitting an email sender to automate business logic steps associated with a given business process, comprising:

selecting an object from an object database, said object including  
5 instructions for carrying out at least some of said business logic steps;

associating said object with an email message to be sent to an email recipient;

sending said email message to said recipient over a computer network, thereby causing at least some of said instructions to be carried out.

10

2. The method of claim 1 wherein said network is a corporate local area network.

3. The method of claim 1 wherein said network is a  
15 heterogenous, distributed computer network.

4. The method of claim 1 wherein said instructions include sending communication to another person other than said sender and said recipient.

20

5. The method of claim 1 wherein at least some of said instructions are executed automatically upon said sending without prompting by said recipient.

6. The method of claim 1 wherein said instructions include instructions for automatically sending out a reminder at a later date responsive to a due date set prior to said sending, said later date represents a date later in time than said sending.

5

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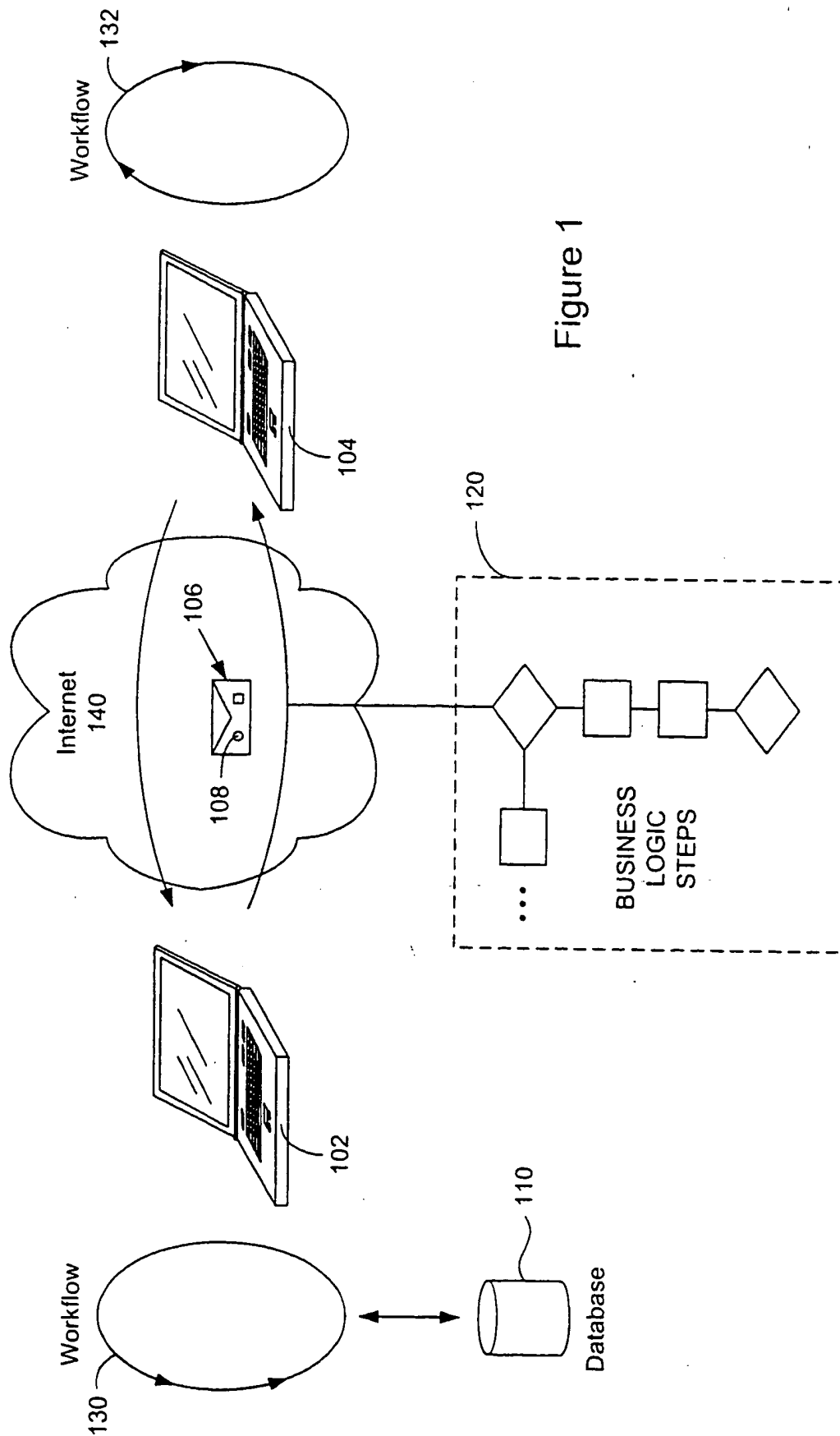


Figure 1

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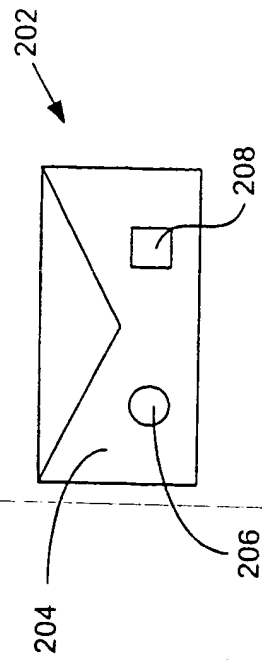


Figure 2

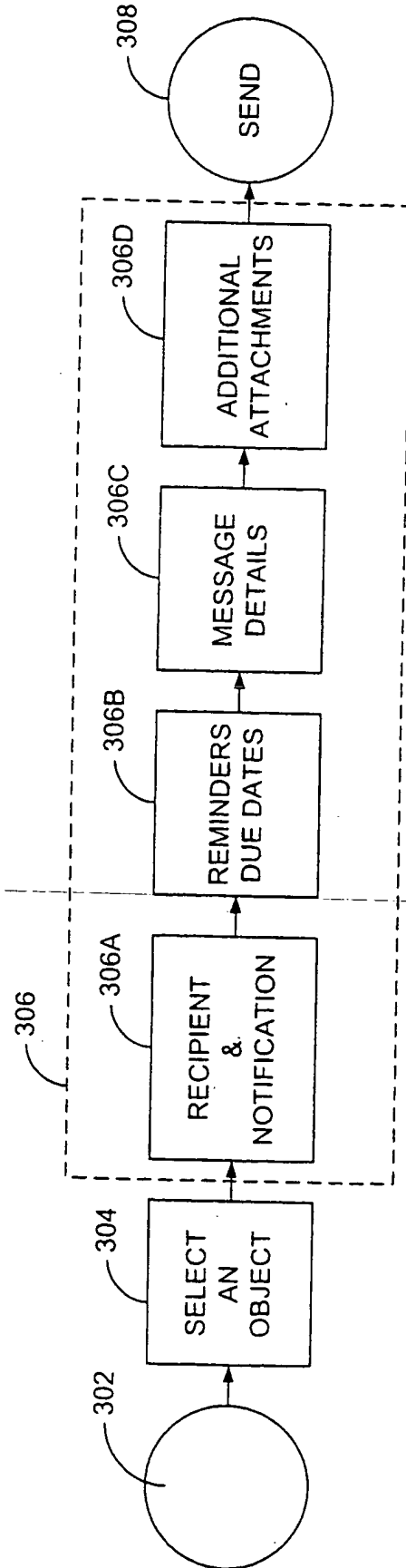


Figure 3

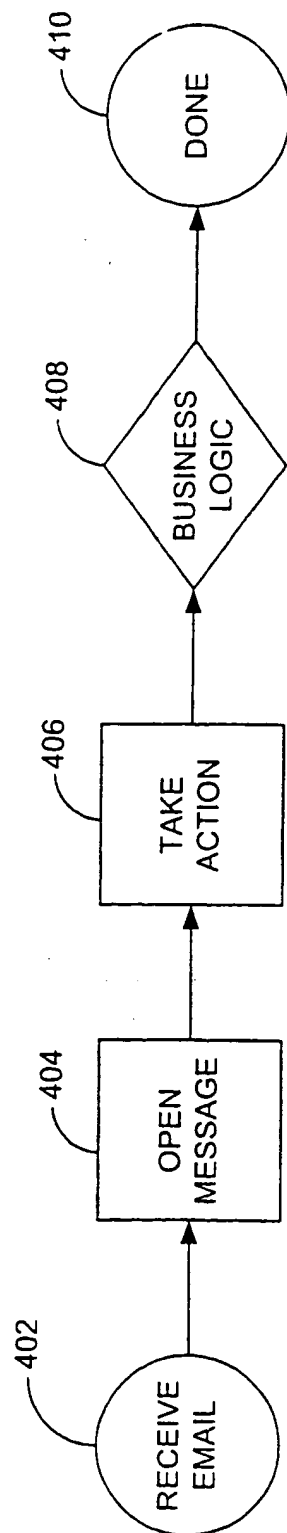


Figure 4

4/4

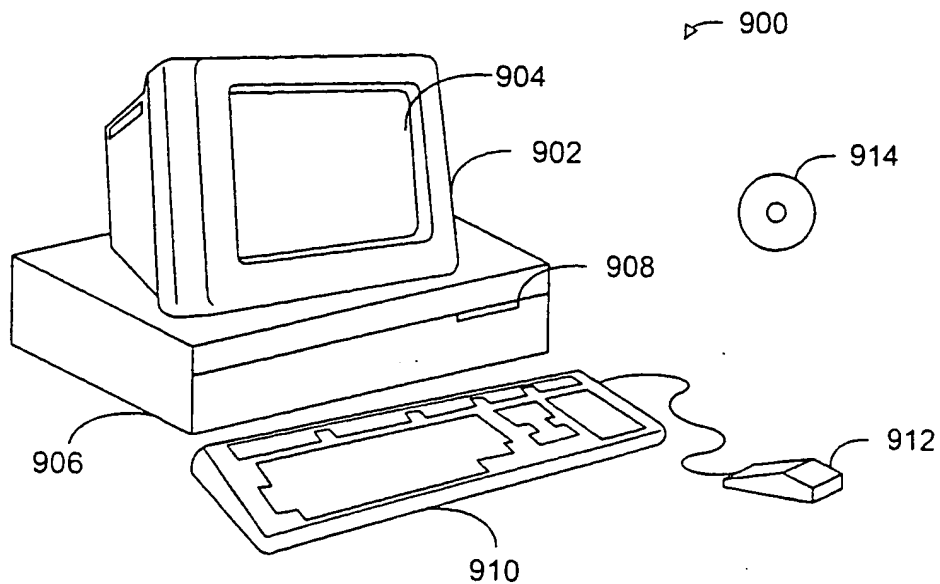


Figure 5A

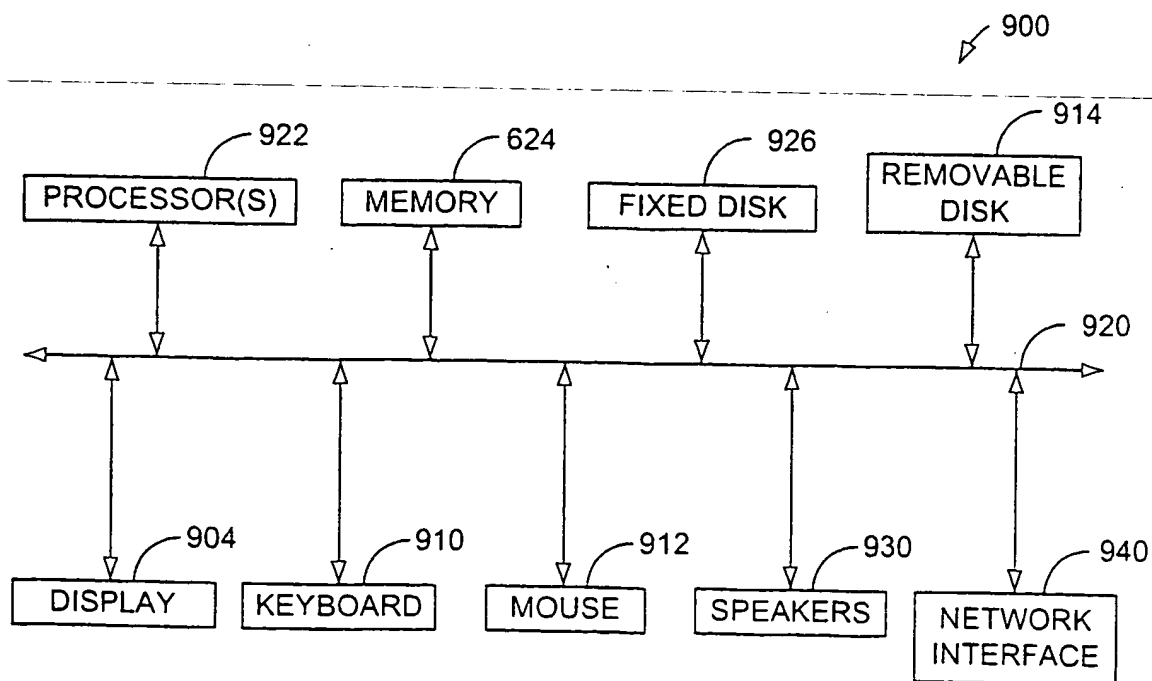


Figure 5B

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/03024

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G06F 15/16

US CL :709/206, 207

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/206, 207, 204, 246; 345/329, 330

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

STN

search terms: trigger condition, object, script, vacation permission, purchase grant, multiple groups

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,016,478 A (ZHANG et al.) 18 January 2000, see entire document.	1-6
A,P	US 6,047,310 A (KAMAKURA et al.) 04 April 2000, col. 5, line 51 - col. 8, line 14.	1-6
A,P	US 6,128,646 A (MILOSLAVSKY) 03 October 2000, col. 2, line 52 - col. 4, line 47.	1-3
A,P	US 6,131,087 A (LUKE et al.) 10 October 2000, col. 9, line 27 - col. 10, line 63.	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

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